Combined carotid and coronary revascularization: is this a good idea?

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Disclosures

Consultant:

- Abbott Vascular
- Boston Scientific
- Medtronic
- Spectranetics

Medical Advisory Boards:

- Abbott Vascular
- Boston Scientific
- Medtronic

Outline

- Background
- Data
  - Symptomatic vs asymptomatic
  - CABG + CEA, vs CABG + staged CEA or CABG + staged CAS
  - All endovascular
- Conclusion

Background

- Significant carotid stenosis (>/= 80%) exists in 6-12% of patients requiring open heart surgery[1]
- Neurological events occur in approximately 2% of open heart operations [1,2]
- Most patients have asymptomatic carotid disease

From [1] Berens et al. *J Vasc Surg* 1992 and Schwartz et al. *J Vasc Surg* 1995.
[2] From Barnes et al. *Surgery* 1981.

Stroke Risk with CABG

- Asymptomatic
  - 50-99% unilateral: 3%
  - 50-99% bilateral: 5%
  - Any occlusion: 7-11%
- Symptomatic
  - Increases by 4X

From Brown et al. *J Vasc Surg* 2003, D'Agostino et al. *Ann Thorac Surg* 1996, Naylor et al. *Eur J Vasc Endovasc Surg* 2002, Naylor et al. *Eur J Vasc Endovasc Surg* 2003, Naylor et al. *Eur J Vasc Endovasc Surg* 2009, Ricotta et al. *Stroke* 2003

CABG + CEA: higher rate with combination

- Comparison between 100 consecutive CABG + CEA patients vs 114 patients undergoing CEA w/o CABG
- 57% symptomatic and 28% with contralateral occlusion in combo group
- Perioperative mortality and stroke in combo group 8% and 9%%
- In CEA alone group 1.8% and 2.6% (p=0.035 and 0.05 respectively)

From Mackey et al. *J Vasc Surg* 1996

CABG + CEA: association with stenosis degree

- 582 pts at VAMC (asymptomatic carotid)
- >/= 80% stenosis of 1 or both ICA present in 12% (70 pts)
- In hospital stroke or death rate was 6.2% (36 pts)
- No strokes in those with 50-79% stenosis
- Presence of carotid stenosis/occlusion was associated with hemispheric CVA (p=0.0072)

From Schwartz et al. *J Vasc Surg* 1995

Concurrent carotid and coronary revascularization

	Post-operative stroke	Death and Stroke	In-hospital Death
CAS + CABG	2.4%*	6.9%	5.2%
CEA + CABG	3.9%	8.6%	5.4%

- *P<0.001
- 27,084 pts from Nationwide Inpatient Sample (NIS) over 5 year period
- 96.7% CEA + CABG, 3.3% CAS + CABG

From Timaran et al. *J Vasc Surg* 2008

Combination revascularization: Independent predictors of death and/or CVA

CEA associated with 62% increased risk of postoperative stroke

Predictor	*Coefficient*	*OR*	*95% CI*	P
Postoperative stroke				
CEA-CABG (vs CAS-CABG)	0.504	1.66	1.1-2.6	.015
Age	0.021	1.02	1.01-1.03	<.001
Symptomatic carotid stenosis	1.589	4.90	4.0-5.9	<.001
Charlson comorbidity index	0.253	1.29	1.2-1.3	<.001
In-hospital mortality				
Age	0.061	1.06	1.1-1.2	<.001
Female sex	0.817	2.26	2.0-2.5	<.001
Acute myocardial infarction	0.505	1.66	1.5-1.9	<.001
Renal failure	1.128	3.09	2.6-3.6	<.001
Elective admission	0.204	1.23	1.1-1.4	<.001

From Timaran et al. *J Vasc Surg* 2008

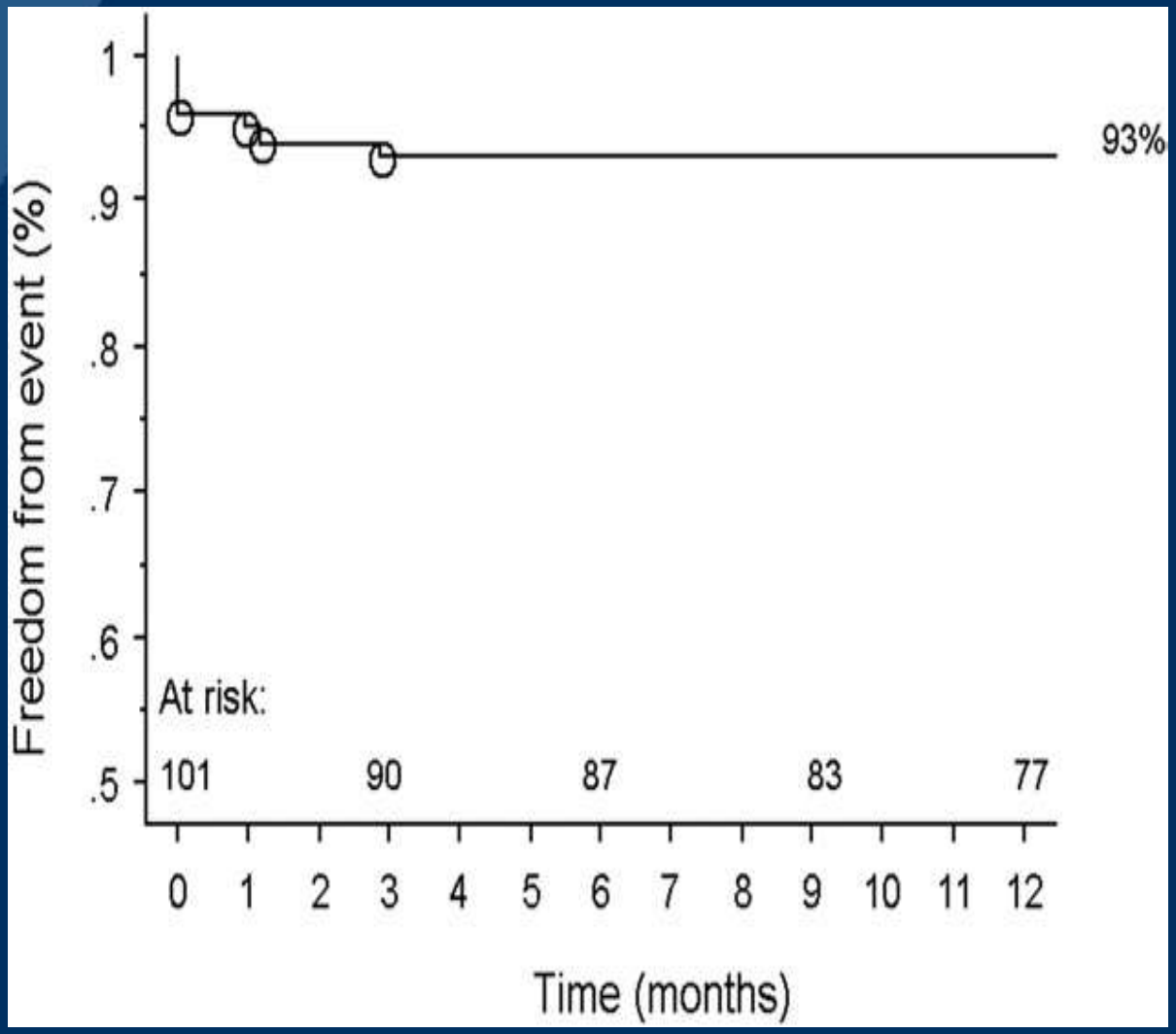
SHARP Study

- 101 consecutive pts undergoing CABG immediately post-CAS
- Carotid stenosis treated was 79% for symptomatic, 81% for asymptomatic
- 78% three-vessel CAD (41% L main)
- Surgical risk (EuroSCORE 8.6)

From Versaci et al. *J Am Coll Cardiol Intv*. 2009

Event rates at 30 days and 12 months

7% total event rate at 12 months



From Versaci et al. *J Am Coll Cardiol Intv*. 2009

FRIENDS Study

	Surgical	Endovascular	Hybrid
Primary Outcome (D/MI/S)	4.8%	2.4%	8.6%
Secondary Outcome (AKI/Bleed/Resp)	10.1%	6.5%	23.8%

Endo superior to hybrid for primary and secondary outcome ($p<0.007$ and $p<0.001$)

Endo superior to surgical for secondary outcome ($p<0.006$)

From Ribichini et al. *Eurointervention* 2010

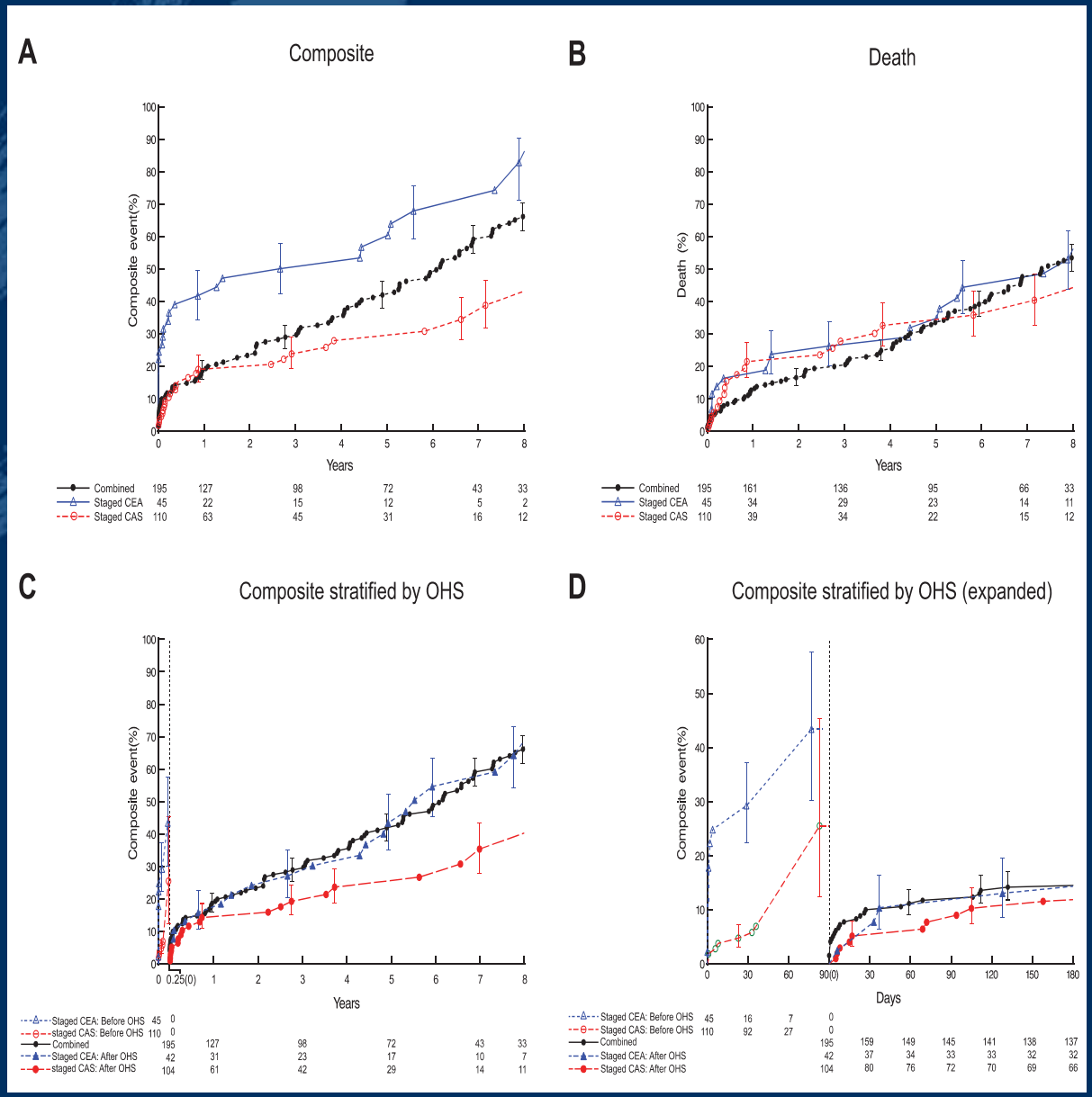
Comparison of 3 strategies

- 350 pts with revascularization of carotid within 90 days of open heart surgery
  - 45-CEA followed by OHS
  - 195- combination CEA-OHS
  - 110- CAS followed by OHS (82% EPD rate)

- 19% of patients had symptomatic carotid disease
- 92% of open heart involved CABG
- 106 pts with L main, 195 pts with 3vD
- 12% admitted with USA, 7% admitted with MI

From Shishehbor et al. *J Am Coll Cardiol* 2013.

Outcomes of the three strategies



From Shishehbor et al. *J Am Coll Cardiol* 2013.

Outcomes: more detail

Events	Staged CEA-OHS (n = 45)	Combined CEA-OHS (n = 195)	Staged CAS-OHS (n = 110)	p Value
Interstage interval				
Composite*	13 (29)	NA	8 (7)	<0.001
Death	3 (7)	NA	6 (5)	0.77
Stroke	1 (2)	NA	1 (1)	0.51
MI	11 (24)	NA	3 (3)	<0.001
Overall 30-day post-OHS†				
Composite*	14 (31)	19 (10)	11 (10)	0.003
Death	3 (7)	9 (5)	7 (6)	0.75
Stroke	1 (2)	13 (7)	2 (2)	0.11
MI	11 (24)	1 (0.5)	3 (3)	<0.001
Early hazard phase (≤1 yr)‡				
Composite*	18 (40)	33 (17)	18 (16)	0.001
Death	7 (16)	24 (12)	14 (13)	0.84
Stroke	3 (6.7)	17 (8.7)	2 (1.8)	0.06
MI	11 (24)	1 (0.51)	4 (3.6)	<0.001
Late hazard phase (>1 yr)‡				
Composite*	12 (27)	77 (39)	13 (12)	<0.001
Death	17 (38)	77 (39)	12 (11)	<0.001
Stroke	1 (2.2)	3 (1.5)	0 (0)	0.37
MI	0 (0)	6 (3.1)	3 (2.7)	0.50

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Highest risk strategy due to MI

From Shishehbor et al. *J Am Coll Cardiol* 2013.

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Strategy with lower events than either CEA first (p=0.01) or combo p=0.003)

From Shishehbor et al. *J Am Coll Cardiol* 2013.

Conclusion

- If coronary situation is urgent: combination revascularization is appropriate (CAS safer than CEA)
- If coronary artery disease can wait 3-4 weeks: CAS followed by CABG probably best
- Staged CEA followed by CABG probably should be avoided if possible

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